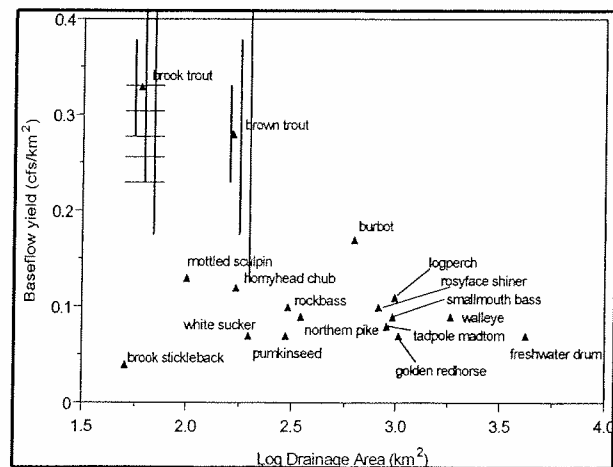
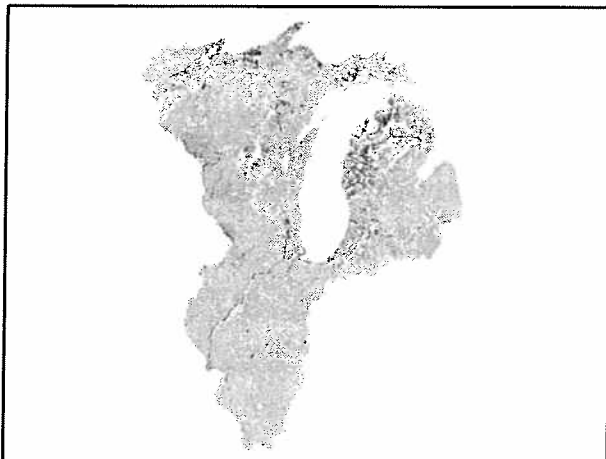
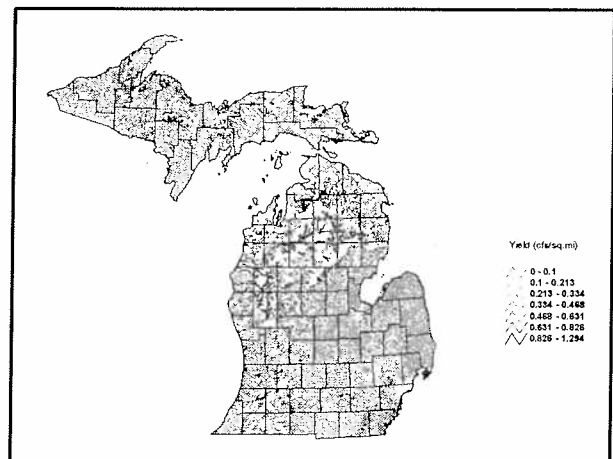
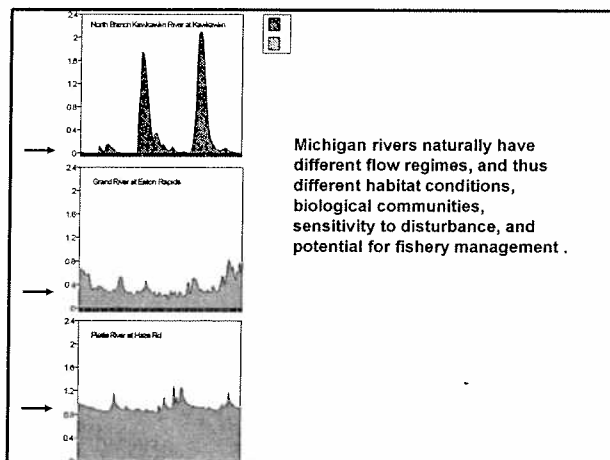
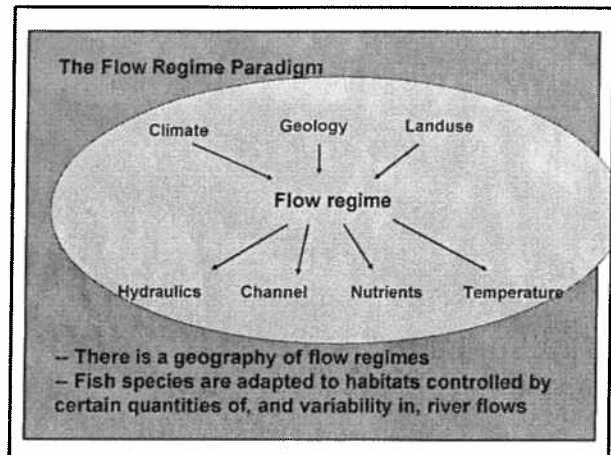
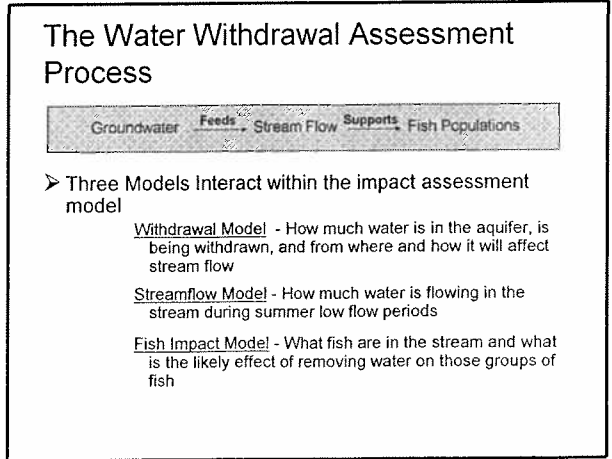
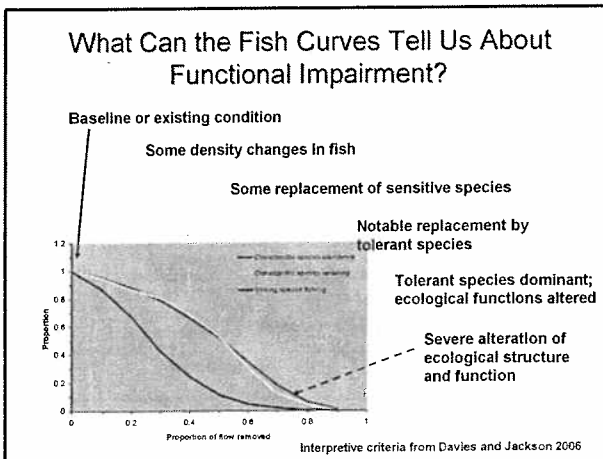
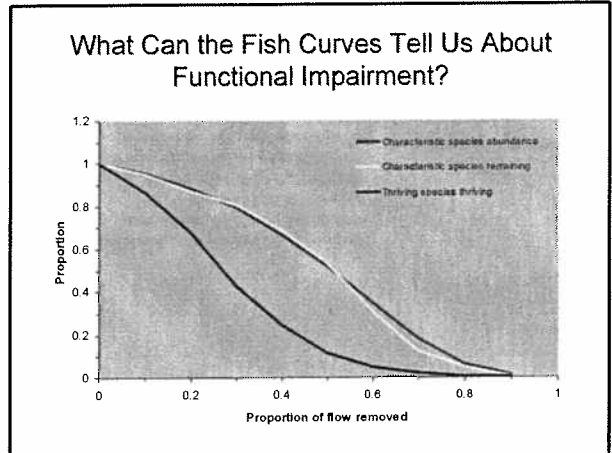
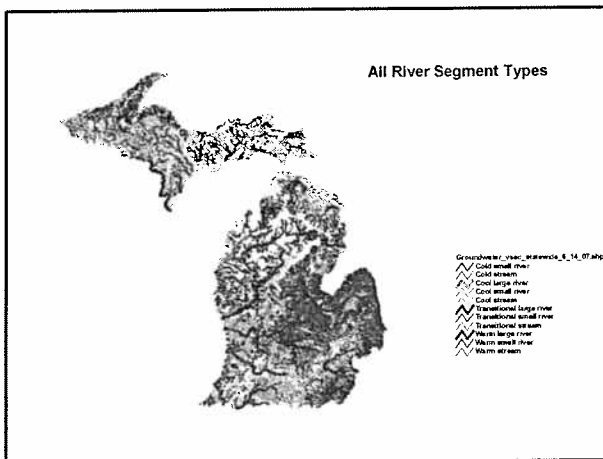
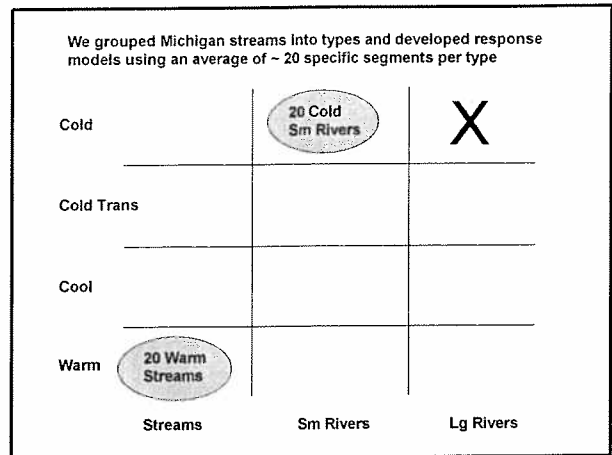
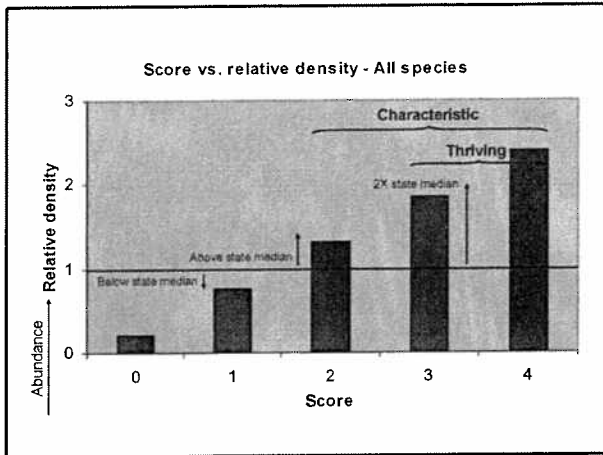


## Overview

- Context: Regional Water Management
- Definitions
  - Water withdrawal assessment tool
  - Screening tool
- Framework: Assessment Tool
- Demonstration: Screening Tool
- Policy Issues





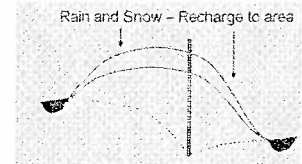
## The Water Withdrawal Assessment Process

This is the process that the user goes through to see whether the proposed withdrawal is OK or is likely to cause an adverse effect on fish populations

- **Screening Tool** – The Automated Analysis within the model based on general, state-wide data for a given withdrawal
- **Site Specific Analysis** – Same process but using professional evaluation of site-specific data on flow, geology or fish

## 1. The Withdrawal Model

- Model needs to know how much water is in the local aquifer
- Automatically determines where the nearest streams are.
  - Apportions the withdrawal effect between streams
- Calculates the likely reduction in flow due to the proposed withdrawal



## Characteristics of the Withdrawal Model

- **Distance Matters**
  - A well adjacent to a river will very quickly get water either from water that would have gone to the river or directly from the river
  - A well farther from a river will get more water from storage and require a longer time to affect the stream
- **Geology and Soil Matters**
  - Clay soils are “tight” and water does not move easily
  - Sandy soils are “porous” and water flows quickly

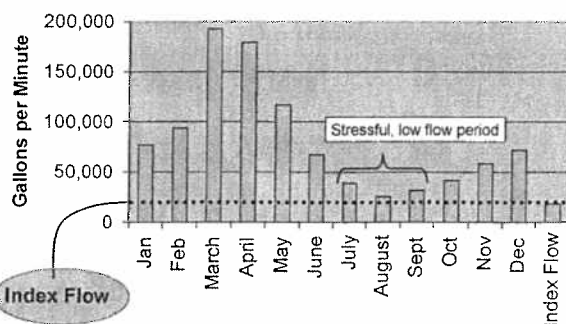
## 2. The Streamflow Model

- Need to Know How Much Flow is in any Stream Segment
- “Index flow”; low flow period in the year
- Look at the segments where we know the flow (132 stream gauges in the State) and extrapolate these to the streams that are not gauged

### Major Factors Used

- Drainage Basin Size
- Forest Cover
- Geology and Soils
- Precipitation

## Looking Glass River near Eagle Mean Monthly Flows



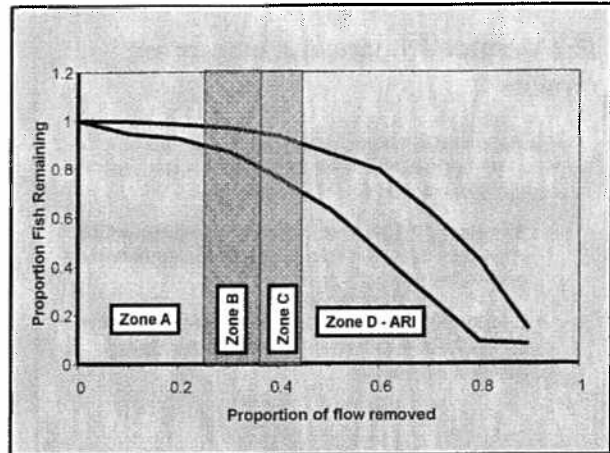
### Major Factors in the Analysis

- The geographic database contains info for 11,000 distinct watersheds and streams
- Info on watershed location, size, geology, and on stream flow, temperature, and fish populations
- Resulting maps closely match field experiences



### 3. The Fish Response Model

- What fish populations live where in the streams and how do they respond to flow reductions in the summer (at low flow)



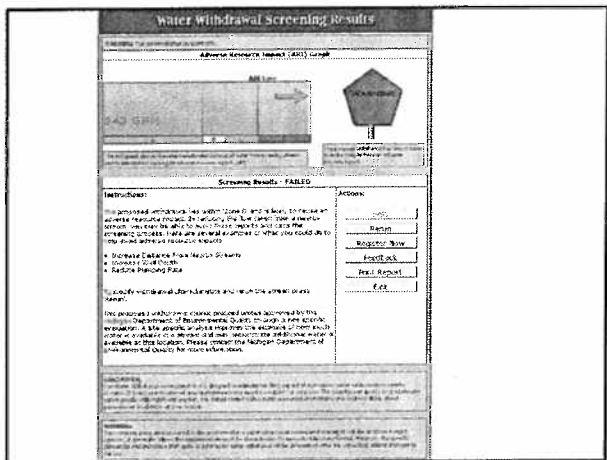
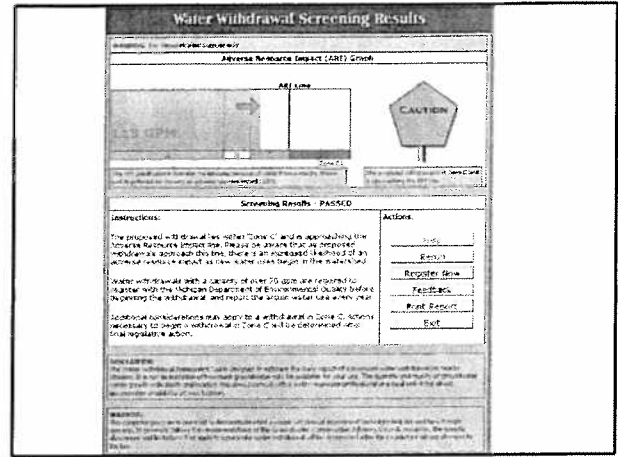
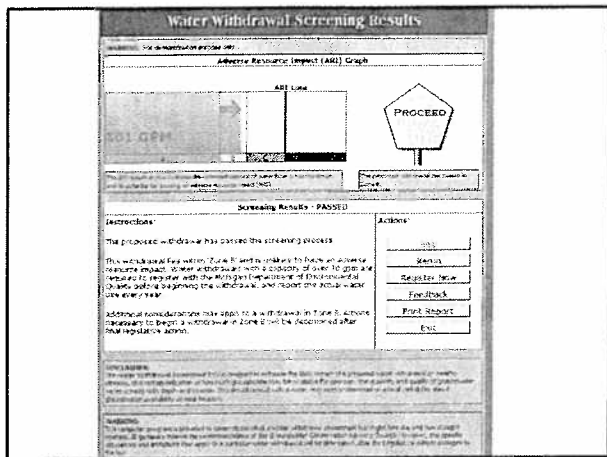
The screenshot shows the 'WATER WITHDRAWAL ASSESSMENT TOOL' interface. The sidebar on the left contains links for 'Home', 'About', 'FAQ', 'Contact', 'Help', 'Privacy Policy', 'Terms of Service', 'Disclaimer', 'Feedback', 'Support', 'Partners', 'Sponsors', 'Media', 'Press', 'Events', 'Publications', 'Reports', 'Data', 'Tools', 'Services', 'Products', 'Pricing', 'Contact Us', 'Sign Up', 'Log In', 'Forgot Password', 'Reset Password', 'Create Account', 'Verify Account', 'Update Profile', 'Change Password', 'Delete Account', 'Account Settings', 'Profile Information', 'Contact Information', 'Billing Information', 'Subscription Information', 'Account History', 'Account Activity', 'Account Security', 'Account Permissions', 'Account Roles', 'Account Groups', 'Account Roles', 'Account Groups', 'Account Roles', 'Account Groups'. The main content area features a map of Michigan with a red dot indicating a withdrawal location. The form includes fields for 'Location by Address' and 'Location by Navigation', and a 'Find Address' button.

This screenshot shows the 'WATER WITHDRAWAL ASSESSMENT TOOL' interface with a map of Michigan. The sidebar on the left contains links for 'Home', 'About', 'FAQ', 'Contact', 'Help', 'Privacy Policy', 'Terms of Service', 'Disclaimer', 'Feedback', 'Support', 'Partners', 'Sponsors', 'Media', 'Press', 'Events', 'Publications', 'Reports', 'Data', 'Tools', 'Services', 'Products', 'Pricing', 'Contact Us', 'Sign Up', 'Log In', 'Forgot Password', 'Reset Password', 'Create Account', 'Verify Account', 'Update Profile', 'Change Password', 'Delete Account', 'Account Settings', 'Profile Information', 'Contact Information', 'Billing Information', 'Subscription Information', 'Account History', 'Account Activity', 'Account Security', 'Account Permissions', 'Account Roles', 'Account Groups', 'Account Roles', 'Account Groups', 'Account Roles', 'Account Groups'. The main content area features a map of Michigan with a red dot indicating a withdrawal location. The form includes fields for 'Location by Address' and 'Location by Navigation', and a 'Find Address' button.

The screenshot shows the 'WATER WITHDRAWAL ASSESSMENT TOOL' interface with a form for entering withdrawal location data. The form includes fields for 'Withdrawal Location', 'Withdrawal Type', 'Withdrawal Rate', and 'Withdrawal Depth'. The 'Withdrawal Location' field is set to 'Michigan'. The 'Withdrawal Type' field is set to 'Surface Water'. The 'Withdrawal Rate' field is set to '100 GPM'. The 'Withdrawal Depth' field is set to '100 ft'. The 'Find Address' button is visible at the bottom of the form.

The screenshot shows the 'Water Withdrawal Screening Results' screen. The screen displays a bar chart showing the 'GPM' (Gallons Per Minute) for the withdrawal location. The chart shows a single bar for 'GPM' with a value of 100. The screen also includes a 'PROCEED' button and a 'Screening Results' section. The 'Screening Results' section contains a table with the following data:

Screening Results	Passed
Flow Rate	Yes
Flow Depth	Yes
Flow Type	Yes
Flow Rate	Yes
Flow Depth	Yes
Flow Type	Yes

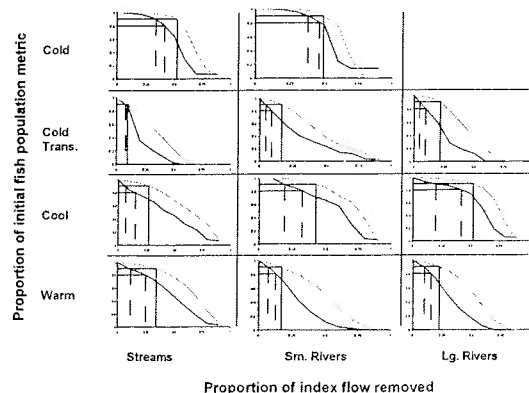


## Water Withdrawal Legislation Policy Issues

- Application of Assessment Tool
- Permitting thresholds
- Decision-making standards
- Citizen involvement
- Water user responsibilities
- Program administration
- Future Issues

## Application of Assessment Tool

- Use of output
  - Zones
  - Multiple curves



## Permitting Thresholds

- Requirement trigger
  - Volume
  - Flow percentage
  - Zones
  - Sensitive areas
- Exemptions
- Permanent or renewable
- Application material

## Decision-Making Standards

- ARI and other ecological impacts
- Public interest test
- Restoration

## Citizen Involvement

- Permit application public comment
- "User" committees: membership and role
- Compliance: Complaints
- Enforcement: private attorneys general
- Advisory Council

## Water User Responsibilities

- Registration and reporting exemptions
- Conservation measures
- Address impacts

## Program Administration

- Complexity
- Cost and revenue
  - Tool support
  - Program activities

## Future Issues

- Protective model for lakes
- Assessment of impacts to other ecological features